

PATENT

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What is claimed is:

1. A method for depositing a low dielectric constant film on a substrate, comprising reacting two or more organosiloxanes selected from the group consisting of 1,3-dimethyldisiloxane, 1,1,3,3-tetramethyldisiloxane, hexamethyldisiloxane, 1,3-bis(silanomethylene)disiloxane, bis(1-methyldisiloxanyl)methane, 2,2-bis(1-methyldisiloxanyl)propane, 1,3,5,7-tetramethylcyclotetrasiloxane, octamethylcyclotetrasiloxane, 1,3,5,7,9-pentamethylcyclopentasiloxane, 1,3,5,7-tetrasilano-2,6-dioxy-4,8-dimethylene, 1,3,5-trisilanetetrahydropyran, and 2,5-disilanetetrahydrofuran while applying RF power, wherein the low dielectric constant film comprises silicon-carbon bonds and a dielectric constant of about 3 or less.
2. The method of claim 1, wherein at least one of the organosiloxanes is cyclic and comprises C, H, and O.
3. The method of claim 2, wherein the cyclic organosiloxane comprising C, H, and O is 1,3,5,7-tetramethylcyclotetrasiloxane.
4. The method of claim 1, wherein the two or more organosiloxanes are reacted with an oxidizing gas.
5. The method of claim 4, wherein the oxidizing gas is selected from the group consisting of oxygen, ozone, nitrous oxide, carbon dioxide, and water.
6. The method of claim 1, wherein the RF power is pulsed to increase the porosity of the film.
7. A method for depositing a low dielectric constant film on a substrate, comprising reacting two or more organosiloxanes selected from the group consisting of 1,3,5,7-tetramethylcyclotetrasiloxane, octamethylcyclotetrasiloxane, 1,3,5,7,9-pentamethylcyclopentasiloxane, 1,3,5,7-tetrasilano-2,6-dioxy-4,8-dimethylene, 1,3,5-

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trisilanetetrahydropyran, and 2,5-disilanetetrahydrofuran while applying RF power, wherein the low dielectric constant film comprises silicon-carbon bonds and a dielectric constant of about 3 or less.

8. The method of claim 7, wherein at least one of the organosiloxanes is selected from the group consisting of 1,3,5-trisilanetetrahydropyran, and 2,5-disilanetetrahydrofuran.

9. The method of claim 7, wherein the two or more organosiloxanes are reacted with an oxidizing gas while applying RF power.

10. The method of claim 9, wherein the oxidizing gas is selected from the group consisting of oxygen, ozone, nitrous oxide, carbon dioxide, and water.

11. The method of claim 7, wherein the RF power is pulsed to increase the porosity of the film.

12. A method for depositing a low dielectric constant film on a substrate, comprising reacting two or more organosilanes selected from the group consisting of methylsilane, dimethylsilane, trimethylsilane, dimethylsilanediol, ethylsilane, phenylsilane, diphenylsilane, diphenylsilanediol, methylphenylsilane, disilanolmethane, bis(methylsilano)methane, 1,2-disilanoethane, 1,2-bis(methylsilano)ethane, 2,2-disilanopropane, and 1,3,5-trisilano-2,4,6-trimethylene, while applying RF power, wherein the low dielectric constant film comprises silicon-carbon bonds and a dielectric constant of about 3 or less.

13. The method of claim 12, wherein one of the organosilanes is 1,3,5-trisilano-2,4,6-trimethylene.

14. The method of claim 12, wherein the two or more organosilanes are reacted with an oxidizing gas.

15. The method of claim 14, wherein the oxidizing gas is selected from the group consisting of oxygen, ozone, nitrous oxide, carbon dioxide, and water.
16. The method of claim 12, wherein the RF power is pulsed to increase the porosity of the film.
17. A method for depositing a low dielectric constant film on a substrate, comprising reacting two or more organosiloxanes, wherein a first organosiloxane of the two or more organosiloxanes is cyclic and comprises C, H, and O and a ring comprising carbon and oxygen, and a second organosiloxane of the two or more organosiloxanes is selected from the group consisting of 1,3,5,7-tetramethylcyclotetrasiloxane, octamethylcyclotetrasiloxane, and 1,3,5,7,9-pentamethylcyclopentasiloxane, while applying RF power, wherein the low dielectric constant film comprises silicon-carbon bonds and a dielectric constant of about 3 or less.
18. The method of claim 17, wherein the first organosiloxane is selected from the group consisting of 1,3,5-trisilanetetrahydropyran, 2,5-disilanetetrahydrofuran, and 1,3,5,7-tetrasilano-2,6-dioxy-4,8-dimethylene.
19. The method of claim 18, wherein the first organosiloxane is 1,3,5,7-tetrasilano-2,6-dioxy-4,8-dimethylene.
20. The method of claim 17, wherein the two or more organosiloxanes are reacted with an oxidizing gas.